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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/509,644
Filing Date: September 29, 2004
Appellant(s): LOBREGT, STEVEN

Anthony M. Del Zoppo, III

For Appellant

SUPPLEMENTAL EXAMINER'S ANSWER

This is in response to the appeal brief filed 3/26/09 appealing from the Office action mailed 1/23/07.

The Real Party in Interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief filed on 3/2/2009 is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief filed on 3/2/2009 is correct.

(8) Evidence Relied Upon

5,606,348	CHIU	02-1997dfsdfas
5,611,025	LORENSEN	03-1997

5,748,199	PALM	05-1998
5,953,013	SHIMIZU	09-1999
6,501,468	KAJI	12-2002
6,762,794	OGINO	7-2004

Holbrook, M., Three-Dimensional Stereographic Visual Displays in Marketing and Consumer Research, 1997, Columbia University, Volume 1997, No. 11., pp. 1-30.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 3, 5, 13-15 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu (US Patent 5,953,013) in view of Kaji (US Patent 6,501,468).

Regarding claims 1 and 13, Shimizu teaches a method and system of visualizing an internal hollow organ of a subject based on a volumetric scan in Figure 9, column 11 lines 30-31 ("*...a procedure of constructing a three-dimensional image by using a volume rendering method...*") and in column 12 lines 20-22 ("*...a three-dimensional image is constructed as if the inside of the subject was observed under an endoscope.*"). Shimizu also teaches reconstructing a number of three-dimensional images of the internal surface of the hollow organ in column 12

lines 23-26 ("*…volume rendering method, a three-dimensional image is obtained as if the inside of the subject was observed while an endoscope was moved…*") and column 5 lines 66-67-column 6 lines 1-7 ("*…an X-ray CT apparatus but it can measure a plurality of sliced images three-dimensionally. Accordingly, an image constructed by two-dimensional images arranged three-dimensionally can be obtained by the MRI apparatus. This image is called "volume image". This volume image (three-dimensionally arranged image) can be decomposed into two-dimensionally arranged images (slice arrangement).*"). Shimizu also teaches calculating an image for the left eye from a first view point and an image for the right eye from a second view point that differs from the first view point in column 13 lines 7-15 ("*…the first image obtained from the left eye's view point and the second image obtained from the right eye's view point are seen by the left and right eyes individually…*"). Shimizu also teaches combining the left eye image and the right eye image into a pair to form a stereoscopic image in column 13 lines 42-46, where it is described that the constructed stereoscopic image is generated from the simultaneous viewing of the left and right images, as shown in Figure 11. Shimizu also teaches showing the stereoscopic image using stereoscopic imager means in column 13 lines 42-46 and is illustrated in Figure 12 as element 25. Shimizu fails to teach the first and second view points each have view directions that are essentially parallel to each other. Kaji, in an analogous art of stereoscopic display, teaches that the first and second view points each have view directions that are essentially parallel to each other in column 3 lines 63-64 ("*…the line of sight 31 of the left eye and the line of sight 33 of the right eye are in parallel…*"), and as shown in Figure 6. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the stereoscopic imaging system, as taught by Shimizu, to include an apparatus that provides

essentially parallel view directions for each eye, as taught by Kaji, because this modification would provide an enhanced stereoscopic experience through direct presentation of stereo images to the left and right eyes each with its own respective view direction, as the user is immersed within a realistic virtual environment, thereby improving the realism of the experience.

Regarding claim 2, Shimizu teaches defining a view path through the hollow organ in column 17 lines 17-21 ("*…a three-dimensional original image having a pipe path (such as an intestine or a trachea) formed in the direction of the depth thereof is to be inspected as if the deep side of the pipe path thereof was observed under an endoscope…* "). Shimizu also teaches reconstructing the images as seen from view points lying on the view path in column 17 lines 23-27 ("*In order to track the image in the direction of the depth thereof, the view point, the view line direction and the projection plane are updated…*"), where it is described that as the view points change along the view path, as illustrated in Figure 16, are updated in response to those changes and the three dimensional images are updated or reconstructed as a result of those updates, as described in column 20 lines 31-33 ("*Whenever updating is performed, a three-dimensional image is obtained and displayed on the display screen.*"). Shimizu also teaches one of the first and second view points lie on the view path in column 17 lines 18-26 ("*…in order to track the image in the direction of the depth thereof, the view point, the view line direction and the projection plane are updated in combination.*"), and in column 13 lines 18-22 ("*…the two view points are moved so as to be interlocked with each other so that the projection plane is updated on the assumption that one view point is located in the middle between the two view points.*"), where it is described that the view point lies on the view path, as shown in Figure 16, therefore one of the first and second view points are present on the view path.

Regarding claim 3, Shimizu teaches defining a view path through the hollow organ in column 17 lines 17-21 ("*…a three-dimensional original image having a pipe path (such as an intestine or a trachea) formed in the direction of the depth thereof is to be inspected as if the deep side of the pipe path thereof was observed under an endoscope…* "). Shimizu also teaches reconstructing the images as seen from view points lying on the view path in column 17 lines 23-27 ("*In order to track the image in the direction of the depth thereof, the view point, the view line direction and the projection plane are updated…*"), where it is described that as the view points change along the view path, as illustrated in Figure 16, updates are performed in response to those changes and the three dimensional images are updated or reconstructed as a result of those updates, as described in column 20 lines 31-33 ("*Whenever updating is performed, a three-dimensional image is obtained and displayed on the display screen.*"). Shimizu also teaches that both the first and second view point lie on the view path in column 13 lines 18-22 ("*…the two view points are moved so as to be interlocked with each other so that the projection plane is updated on the assumption that one view point is located in the middle between the two view points.*"), where it is described that the view points lie on the view path moving in a certain view line direction.

Regarding claim 5, Shimizu teaches all the limitations except that the first and second lines extend essentially parallel to the view path at a certain mutual distance. Shimizu teaches defining a view path through the hollow organ in column 17 lines 17-21 ("*…a three-dimensional original image having a pipe path (such as an intestine or a trachea) formed in the direction of the depth thereof is to be inspected as if the deep side of the pipe path thereof was observed under an endoscope…* "). Again, Shimizu fails to teach the first and second lines extend

essentially parallel to the view path at a certain mutual distance. Kaji teaches that the first and second view lines are parallel to a center line or view path in column 3 lines 63-64 ("*…the line of sight 31 of the left eye and the line of sight 33 of the right eye are in parallel…*"), and the view lines are shown at a mutual distance in Figure 6. The motivation to combine the teachings of Shimizu and Kaji is equivalent to the motivation of claim 1.

Regarding claim 14, Shimizu teaches a computer readable media, as illustrated in Figure 12 as element 9, that comprises a program to carry out the method of claim 1 as described in column 12 lines 46-50 ("*…constructs a three-dimensional image by using the main memory 9 as if the inside of the subject was observed under an endoscope, and feeds the resulting three-dimensional image to the display…*") and in column 17 lines 45-47 ("*FIG. 17C shows a program procedure for obtaining a unit three-dimensional image and a three-dimensional image. FIG. 17B shows a shared memory 28 for relaying processing of the programs shown in FIGS. 17A and 17C. The shared memory 28 is included in the main memory 9.*").

Regarding claim 15, Shimizu teaches the viewing means incorporated in a head-mountable display in column 13 lines 37-38 and is also illustrated in Figure 12 as element 25.

Regarding claim 17, Shimizu teaches a means for generating the images as seen from one of the first and second viewpoints in column 41 lines 44-60 ("*…means for locating a view point within the first two-dimensional sectional image for generating a first two-dimensional transverse cross sectional image…means for…generating at least a second two-dimensional transverse cross sectional image of the first two-dimensional sectional image…*") and also teaches that one of the first and second view points lie on the view path in column 17 lines 18-26 ("*…in order to track the image in the direction of the depth thereof, the view point, the view line*

direction and the projection plane are updated in combination.") and in column 13 lines 18-22 ("*…the two view points are moved so as to be interlocked with each other so that the projection plane is updated on the assumption that one view point is located in the middle between the two view points.*"), where it is described that the view point lies on the view path, as shown in Figure 16, therefore one of the first and second view points are present on the view path.

Regarding claim 18, Shimizu teaches a means for generating the images as seen from both the first and second viewpoints in column 41 lines 44-60 ("*…means for locating a view point within the first two-dimensional sectional image for generating a first two-dimensional transverse cross sectional image…means for…generating at least a second two-dimensional transverse cross sectional image of the first two-dimensional sectional image…means for displaying at least the first and second two-dimensional transverse cross sectional images in a stacked form so as to represent a three-dimensional transverse cross sectional image of an interior of the object to be inspected.*") and also teaches that both the first and second view point lie on the view path in column 13 lines 7-15 *("…(three-dimensional images) individually in the same direction of turning of eyes so that the first image obtained from the left eye's view point and the second image obtained from the right eye's view point are seen by the left and right eyes individually, the three-dimensional images after construction can be observed stereoscopically.*").

Regarding claim 19, Shimizu teaches all the limitations except that the first and second view points extend essentially parallel to each other. Kaji teaches that for each image the first view point resides on a first view line and the second view point resides on a second view line and the first and second view lines extend essentially parallel to each other in column 3 lines 63-

64 ("*…the line of sight 31 of the left eye and the line of sight 33 of the right eye are in parallel…*"), and as shown in Figure 6. The motivation to combine the teachings of Shimizu and Kaji is equivalent to the motivation of claim 1.

Regarding claim 20, Shimizu teaches that the view path is positioned between the first and second view lines in column 13 lines 18-22 ("*…the two view points are moved so as to be interlocked with each other…one view point is located in the middle between the two view points.*"). However, Shimizu fails to teach first and second view lines that extend essentially parallel to that view path. Kaji teaches that the first and second view lines are parallel in column 3 lines 63-64 ("*…the line of sight 31 of the left eye and the line of sight 33 of the right eye are in parallel…*") to a center line or view path in Figure 6 illustrated as element 37. The motivation to combine the teachings of Shimizu and Kaji is equivalent to the motivation of claim 1.

Claims 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu in view of Kaji and in further view of Lorensen et al.(hereinafter "Lorensen", US Patent 5,611,025).

Regarding claim 4, Shimizu and Kaji fail to teach view points on the view path are alternatively used as first or second view point. Lorensen, in the analogous art of stereoscopic imaging and navigation, teaches selecting any viewpoint in column 4 lines 14-15 ("*…to select an image viewpoint of the 3D surface model, or a series of image viewpoints…*"), therefore the user would be capable of alternatively selecting any viewpoint, including a first or second viewpoint of the left or right eyes respectively that are described to be provided by the renderer in column 5 lines 30-34 ("*Stereoscopic viewing may be used…requires two separate images to be provided to operator 5: one corresponding to the left eye view and one corresponding to the right eye view.*"). It would have been obvious to one of ordinary skill in the art to combine the teachings

of Shimizu, Kaji and Lorensen because this combination would provide efficient traversal of complex internal organs and structures through interactive manipulation and alternation of the viewpoints within the structure, thereby ensuring that internal regions otherwise skipped or avoided by automatic viewpoint generation techniques are interactively visualized by the user.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu in view of Kaji in further view of Ogino (US Patent 6,762,794).

Regarding claim 6, Shimizu and Kaji fail to teach the distance between the first and second viewpoint is essentially one or more millimeters. Ogino, in the analogous art of stereoscopic imaging, teaches a distance between the first and second viewpoints, which is known in the art to be the inter pupillary distance, is one or more millimeters in column 8 lines 19-29 ("*A range within which humans can fuse left and right parallax images presented on display screens as a stereoscopic image…The image-fusible range depends on the characteristics of the human eyes. Considering that the inter-pupillary distance of the human is about 65 mm wide…*"), and is illustrated in Figure 2 as element $2d_h$. It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Shimizu, Kaji and Ogino because this combination would improve the stereoscopic imaging methods of Shimizu and Kaji, by setting the distance between the viewpoints of the eyes to the natural inter pupillary distance known in the art(≈65mm) and as taught by Ogino, therefore eliminating eyestrain or distortion present during the visualization.

Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu in view of Kaji in further view of Palm (US Patent 5,748,199).

Regarding claim 8, Shimizu and Kaji fail to teach these limitations. Palm, in the analogous stereoscopic imaging art, teaches showing the left and right eye image forming a stereoscopic image with different modification in column 12 lines 61-67 ("*...true 3-dimensional stereo presentations to a user are becoming less expensive and are being readily adopted...With respect to imaging, some of these utilize field sequential technology with polarizing glasses.*"), where it is described that the stereoscopic image is shown with a different modification such as a polarized image. Palm also teaches arranging the stereoscopic imager means such that the left eye image is passed to the left eye and the right eye image is passed to the right eye in column 12 line 67-column 13 line 1 ("*One field of an image is transmitted for the left eye followed by one transmitted for the right eye.*"). It would have been obvious to one of ordinary skill in the art to combine the teachings of Shimizu, Kaji and Palm because this combination would provide an alternate stereoscopic viewing option for the user, which enhances the three-dimensional viewing experience.

Regarding claim 9, Shimizu and Kaji fail to teach these limitations. Palm teaches alternately showing the left and right eye image of a stereoscopic image with different polarization in column 13 lines 1-6 ("*Polarization of each field is oriented to be orthogonal with the other field so that polarized glasses will allow one frame through the left eye piece and one through the right eye piece by switching the polarization to either block or admit light from a field being produced.*"), which provides view means for respectively the left and right eye. The motivation to combine the teachings of Shimizu, Kaji and Palm is equivalent to the motivation of claim 8.

Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu in view of Kaji in further view of Palm, and in further view of Chiu (US Patent 5,606,348).

Regarding claim 10, Shimizu, Kaji and Palm fail to teach the limitations. Chiu teaches showing the left and right eye image of a stereoscopic image with different time multiplexation in column 2 lines 10-15 ("*In a time multiplex method, the image data are presented to the display at different time intervals (i.e. displaying the right eye data at time t.sub.0, followed by the left eye data at time t_1, followed by right eye data at time t_2.*"). Chiu also teaches providing the stereoscopic imager means with different viewing means for the left and right eye that are to be activated separately by a control unit based on corresponding time-multiplexation signals in column lines ("*The spatial multiplex method involves presenting the perspective image data at different areas on the screen (i.e. right eye image data on odd columns and left eye image data on even columns on the display; or alternate rows can be used)...This can be accomplished in a time-multiplex or spatial-multiplex fashion. Because of the wide variety of methods used in 3D display systems, each 3D system requires a unique driver controller to present the stereo image data to the display…*"). It would have been obvious to one of ordinary skill in the art to combine the teachings of Shimizu, Kaji, Palm and Chiu because this combination would provide an alternate stereoscopic viewing option for the user, which enhances the three-dimensional viewing experience.

Regarding claim 11, Shimizu teaches the viewing means incorporated in a head-mountable display in column 13 lines 37-38 and is also illustrated in Figure 12 as element 25.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu in view of Kaji in further view of Chiu (US Patent 5,606,348).

Regarding claim 12, Shimizu and Kaji fail to teach the limitations. Chiu teaches the stereoscopic imager means comprising a lenticular screen in column 2 lines 17-23 ("*…presenting the perspective image data at different areas on the screen …In this method, lenticular lens or micro-polarizer filters are the most common devices to use to direct the images to the eyes.*"), where it is described that the display screen used to present the images to the eyes utilizes a lenticular lens, therefore the display screen is a lenticular screen because it comprises lenticular lenses. It would have been obvious to one of ordinary skill in the art to combine the teachings of Shimizu, Kaji and Chiu because this combination would provide precise stereoscopic three dimensional viewing.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu in view of Kaji in further view of Holbrook ("*Three-Dimensional Stereographic Visual Displays Marketing and Consumer Research*").

Regarding claim 16, Shimizu and Kaji fail to teach the limitations. Bourke teaches a distance between a first and second view point is about 1/30 of a distance from the first and second view points to a surface within the internal hollow organ on page 4 in the Stereo Pairs section second paragraph lines 1-3 ("*One common distance between the two photographic exposures mimics the human eyes by being spread about…the optimum ratio for a convincing 3-D effect is about 1:30 for the separation between exposures as a fraction of the distance to the nearest object.*"). It would have been obvious to one of ordinary skill in the art to combine the

teachings of Shimizu, Kaji and Holbrook because this combination would provide accurate perception of depth through the display of images for left and right eyes from a certain distance.

(10) Response to Argument

The appellant argues that the references Shimizu and Kaji used in the 35 U.S.C. 103(a) rejection of claims 1 and 13 both teach non-parallel view directions, however claims 1 and 13 recite "…view directions that are **essentially** parallel to each other…", therefore the view directions taught by Kaji in Figure 6 are equivalent to the essentially parallel view directions recited in the claims, because whether or not the view directions potentially cross at infinity, the illustrated view directions still originate from each eye essentially in a parallel direction.

The appellant also argues that the references Shimizu and Kaji used in the 35 U.S.C. 103(a) rejection of claims 1 and 13 do not provide a motivation for one of ordinary skill in the art to modify the teachings of Shimizu with Kaji because Kaji teaches an unnatural feeling for human perception when viewing objects in close proximity. However, the language recited in claims 1 and 13: "…view directions that are essentially parallel to each other…", does not recite any subject matter related to the proximity or distance of the user from the object. Therefore proximity would not have impeded or prevented one of ordinary skill in the art from modifying the view directions of left and right eye images. It would have been obvious to one of ordinary skill in the art at the time of invention to modify a stereoscopic imaging system, as taught by Shimizu, to include an apparatus that provides **essentially** parallel view directions for each eye, as taught by Kaji, because this modification would provide an enhanced stereoscopic experience through direct presentation of respective stereo images to each eye with its own respective view

direction, as the user is immersed within a realistic virtual environment, thereby improving the realism of the experience.

The appellant also argues that the reference Shimizu used in the 35 U.S.C. 103(a) rejection of claim 2 does not teach one view point lying on the view line, however the appellant stated that Shimizu teaches all of the view points lying on the view line on page 8 5th ¶ lines 5-6 of the Appeal Brief ("*Shimizu teaches placing...all of the viewpoints...on the view line.*"), therefore as Shimizu teaches all of the view points on the view line, the rejection is proper and maintained because the claim recites "…one of the first and the second view point lies on the view path.", which does not limit the method from having more than one view point on the line. Therefore Shimizu teaches that one of the first and the second view point lies on the view path.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Said Broome /Said Broome/

Examiner, Art Unit 2628

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